Washington State Institute for Public Policy

Benefit-Cost Results

Double-dose classes

Benefit-cost estimates updated June 2016. Literature review updated May 2015.

Current estimates replace old estimates. Numbers will change over time as a result of model inputs and monetization methods.

The WSIPP benefit-cost analysis examines, on an apples-to-apples basis, the monetary value of programs or policies to determine whether the benefits from the program exceed its costs. WSIPP's research approach to identifying evidence-based programs and policies has three main steps. First, we determine "what works" (and what does not work) to improve outcomes using a statistical technique called meta-analysis. Second, we calculate whether the benefits of a program exceed its costs. Third, we estimate the risk of investing in a program by testing the sensitivity of our results. For more detail on our methods, see our Technical Documentation.

Program Description: Double dose classes are provided to middle and high school students struggling in reading or, more typically, math. Students participating in this intervention enroll in two reading or math classes instead of one, thus doubling their instructional time in these subjects.

Benefit-Cost Summary Statistics Per Participant

Benefits to:

Taxpayers	$4,061
Participants	$8,096
Others	$3,158
Indirect	($142)
Total benefits	$15,174
Net program cost	($488)
Benefits minus cost	$14,686

Benefit to cost ratio	$31.13
Benefits minus costs	$14,686
Chance the program will produce benefits greater than the costs	98 %

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2015). The chance the benefits exceed the costs are derived from a Monte Carlo risk analysis. The details on this, as well as the economic discount rates and other relevant parameters are described in our Technical Documentation.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Crime	$0	$13	$31	$6	$50
Labor market earnings associated with test scores	$8,497	$3,859	$3,774	$0	$16,130
Health care associated with educational attainment	($137)	$502	($548)	$251	$68
Costs of higher education	($264)	($312)	($99)	($156)	($830)
Adjustment for deadweight cost of program	$0	$0	$0	($244)	($244)
Totals	$8,096	$4,061	$3,158	($142)	$15,174

[1]In addition to the outcomes measured in the meta-analysis table, WSIPP measures benefits and costs estimated from other outcomes associated with those reported in the evaluation literature. For example, empirical research demonstrates that high school graduation leads to reduced crime. These associated measures provide a more complete picture of the detailed costs and benefits of the program.

[2]"Others" includes benefits to people other than taxpayers and participants. Depending on the program, it could include reductions in crime victimization, the economic benefits from a more educated workforce, and the benefits from employer-paid health insurance.

[3]"Indirect benefits" includes estimates of the net changes in the value of a statistical life and net changes in the deadweight costs of taxation.

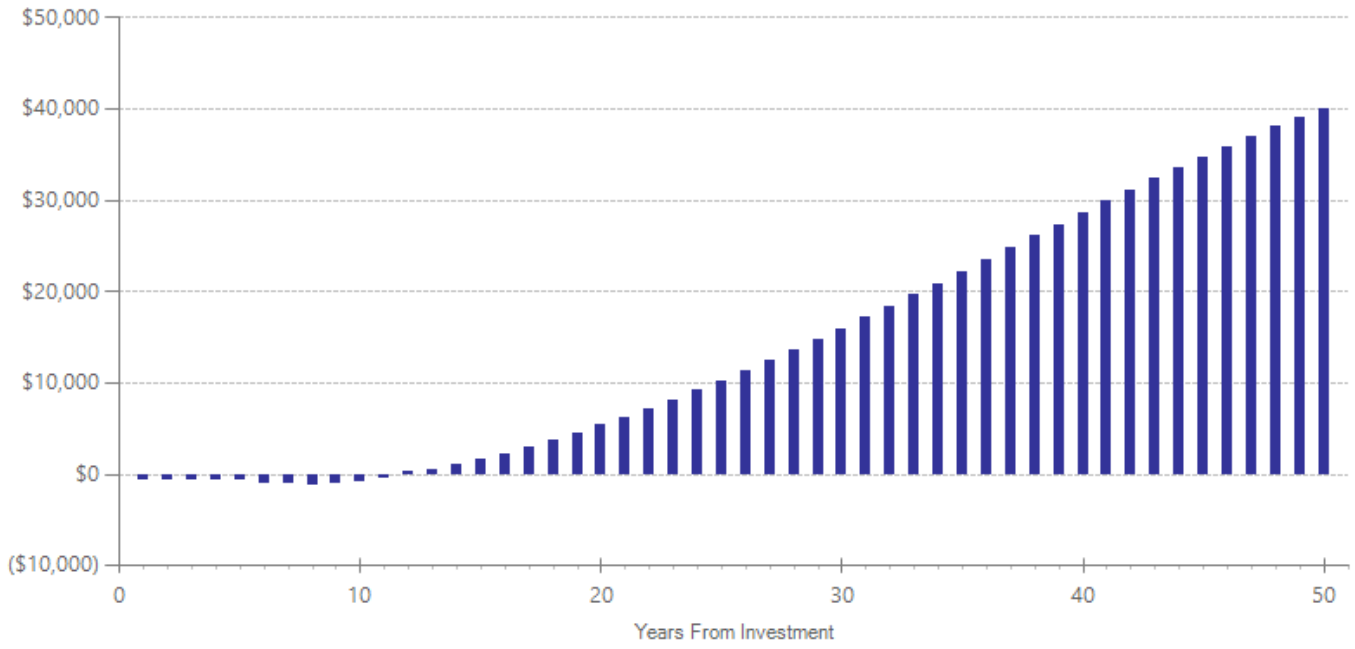
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$479	2013	Present value of net program costs (in 2015 dollars)	($488)
Comparison costs	$0	2013	Cost range (+ or -)	10 %

In the studies reviewed for this estimate, providing "double dose" classes required hiring approximately 15% more teachers to cover the additional classes (this figure accounts for a partial cost offset from hiring fewer elective course teachers). Teachers were provided with three days of professional development and curriculum materials for implementation. To calculate a per-student annual cost, we used average Washington State compensation costs (including benefits) for teachers as reported by the Office of the Superintendent of Public Instruction and add per-student curriculum and teacher training costs.

The figures shown are estimates of the costs to implement programs in Washington. The comparison group costs reflect either no treatment or treatment as usual, depending on how effect sizes were calculated in the meta-analysis. The cost range reported above reflects potential variation or uncertainty in the cost estimate; more detail can be found in our Technical Documentation.

Detailed Annual Cost Estimates Per Participant



The graph above illustrates the estimated cumulative net benefits per-participant for the first fifty years beyond the initial investment in the program. We present these cash flows in non-discounted dollars to simplify the "break-even" point from a budgeting perspective. If the dollars are negative (bars below $0 line), the cumulative benefits do not outweigh the cost of the program up to that point in time. The program breaks even when the dollars reach $0. At this point, the total benefits to participants, taxpayers, and others, are equal to the cost of the program. If the dollars are above $0, the benefits of the program exceed the initial investment.

Meta-Analysis of Program Effects

Outcomes measured	No. of effect sizes	Treatment N	Adjusted effect sizes and standard errors used in the benefit-cost analysis						Unadjusted effect size (random effects model)	
			First time ES is estimated			Second time ES is estimated				
			ES	SE	Age	ES	SE	Age	ES	p-value
Test scores	5	30857	0.093	0.041	13	0.093	0.041	17	0.093	0.023
High school graduation	2	10463	0.045	0.022	18	0.045	0.022	18	0.045	0.040

Meta-analysis is a statistical method to combine the results from separate studies on a program, policy, or topic in order to estimate its effect on an outcome. WSIPP systematically evaluates all credible evaluations we can locate on each topic. The outcomes measured are the types of program impacts that were measured in the research literature (for example, crime or educational attainment). Treatment N represents the total number of individuals or units in the treatment group across the included studies.

An effect size (ES) is a standard metric that summarizes the degree to which a program or policy affects a measured outcome. If the effect size is positive, the outcome increases. If the effect size is negative, the outcome decreases.

Adjusted effect sizes are used to calculate the benefits from our benefit cost model. WSIPP may adjust effect sizes based on methodological characteristics of the study. For example, we may adjust effect sizes when a study has a weak research design or when the program developer is involved in the research. The magnitude of these adjustments varies depending on the topic area.

WSIPP may also adjust the second ES measurement. Research shows the magnitude of some effect sizes decrease over time. For those effect sizes, we estimate outcome-based adjustments which we apply between the first time ES is estimated and the second time ES is estimated. We also report the unadjusted effect size to show the effect sizes before any adjustments have been made. More details about these adjustments can be found in our Technical Documentation.

Citations Used in the Meta-Analysis

Bartik, T.J., & Lachowska, M. (2014). *The effects of doubling instruction efforts on middle school students' achievement: Evidence from a mutiyear regression-discontinuity design* (Working Paper 14-205). Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.

Cortes, K., Goodman, J., & Nomi, T. (2014). *Intensive math instruction and educational attainment: Long-run impacts of double-dose algebra* (Working Paper 20211). Cambridge, MA: National Bureau of Economic Research.

Dougherty, S.M. (2015). Bridging the discontinuity in adolescent literacy?: Mixed evidence from a middle grades intervention. *Education, Finance, and Policy, 10*(2), 157-192.

Fryer, R.G. (2011). *Injecting successful charter school strategies into traditional public schools: Early results from an experiment in Houston* (NBER Working Paper 17494). Cambridge, MA: National Bureau of Economic Research.

Taylor, E. (2014). Spending more of the school day in math class: Evidence from a regression discontinuity in middle school. *Journal of Public Economics, 117*, 162-181.

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